

REMARKS

The Examiner is thanked for the due consideration given the application. Claims 55-91 are pending in the application. No new matter is believed to be added to the application by this response.

The claims of the invention have been restricted into the following groups:

Group I, claims 55-71, drawn to a method for making carbon nanotubes.

Group II, claims 72-79, drawn to an apparatus.

Group III, claims 80-82, drawn to carbon nanotubes.

Group IV, claims 83-84, drawn to a composite.

Group V, claim 85, drawn to dispersion or liquid composition.

Group VI, claims 86, drawn to "a functional material."

Group VII, claims 87-89, drawn to a film.

Group VIII, claims 90-91, drawn to "a device."

Group I, claims 55-71 is elected with traverse.

The Official Action refers to PCT Rules 13.1 and 13.2 and asserts that the claims of the present applications do not relate to a single general inventive concept. The Official Action argues that the only special technical feature common for all the claims is that they all relate to carbon nanotubes. Further, The Official Action asserts that carbon nanotubes are

well known and thus cannot form a special technical feature defining a contribution that each of the claimed inventions makes over the prior art, as the PCT Rule 13.2 requires.

Applicant disagrees.

First, as would be clear to one reading the present application, the Applicant is of course not trying to patent "carbon nanotubes" in general or manufacturing or use thereof. As clearly defined in claims 55, the present invention is based on general principles comprising:

- CNT formation in a gas phase;
- separation of the catalyst particle production and the actual CNT synthesis, thus enabling controlling and optimizing these two stages independently; and
- using one of the three listed processes to produce the catalyst particles.

These features form the "general inventive concept" of the present invention.

Independent claim 72 sets forth an apparatus having means to perform one-to-one the steps of the method claim 55. Claim 80 refers to claim 1, thus incorporating into its definition the method of claim 1. Claims 83, 85, 86, 87, and 90 all refer either directly or via each other to claim 80. Thus, it is clear that all the claim groups share the same general inventive concept explained above.

As an indication of the putported lack of novelty the examiner first referred to articles by DAI and IJIMA. In light of the above explanation concerning the real general inventive concept of the present invention, the referred articles have no relevance in evaluation the novelty thereof. In the process described by DAI, the single-walled nanotubes were synthesized from a powder of catalyst material sitting in a heated vessel in a reactor. It is not an aerosol method and is not relevant to this discussion. IJIMA reported synthesizing multi-walled nanotubes directly from vaporized carbon and without use of a catalyst material at all. Also this is an approach entirely different from the principles of the present invention.

Moreover, SMALLEY et al. (U.S. Patent 7,052,668) was referred to as a novelty barrier to the present invention. It is not clear whether this reference is set forth as a novelty barrier for the reactor claims 72 - 79 or for the process claims 55 - 71. Anyway, SMALLEY et al. do not disclose the principles of the present invention. As the document itself describes in the "Summary of the Invention" section:

"Prior to introduction into the reaction zone, the carbon containing feedstock gas is heated to a temperature, which after mixing with any catalyst containing streams, is sufficient for the initiation and growth of single-wall carbon nanotubes. Transition metal-containing compounds, which serve as catalyst precursors, can be introduced in a separate carrier gas stream into the reactor. The carrier gas may

comprise feedstock gas and other non-reactive species. Prior to introduction into the reaction zone, the catalyst precursor molecules are kept under conditions (such as temperature, pressure and carrier gas mixture) where they are stable. Upon entering the reaction zone, the catalyst precursors undergo chemical processes such as dissociation and subsequent reactions of the dissociated fragments, forming metal-containing clusters that serve as catalysts for the formation of single-wall carbon nanotubes in the reaction zone."

Thus, in the process of SMALLEY et al., the catalyst particles are not formed beforehand, separately from the CNT synthesis but via decomposition of the catalyst precursors in the reaction zone, after mixing the catalyst containing stream with the carbon-containing feedstock gas. Moreover, said catalyst formation does not fall within the definition of any of the three alternative catalyst particle formation processes determined in claim 55 and 72. In other words, SMALLEY et al. do not disclose a process or an apparatus according to the present invention

Accordingly, rejoinder and prosecution of all the claims on the merits is respectfully requested.

CONCLUSION

Early and favorable prosecution on the merits is respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future submissions, to charge any deficiency or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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